(19.5) Calculate the thermal fission factor for a mixture of 60% ^{239}Pu, 30% ^{240}Pu, and 10% ^{241}Pu.

We will use % directly in the equations. For α it will cancel out and for ν we have to divide by 100.

$barn := 10^{-28} \cdot m^2$

$\sigma_{f239} := 745.2 \cdot barn$ $\sigma_{f240} := 0.030 \cdot barn$ $\sigma_{f241} := 1009 \cdot barn$

$\sigma_{\gamma 239} := 268.8 \cdot barn$ $\sigma_{\gamma 240} := 289.5 \cdot barn$ $\sigma_{\gamma 241} := 368 \cdot barn$

$\nu_{239} := 2.871$ $\nu_{240} := 2.90$ $\nu_{241} := 2.927$

$$\alpha_{tot} := \frac{60 \cdot \sigma_{\gamma 239} + 30 \cdot \sigma_{\gamma 240} + 10 \cdot \sigma_{\gamma 241}}{60 \cdot \sigma_{f239} + 30 \cdot \sigma_{f240} + 10 \cdot \sigma_{f241}} \qquad \nu_{tot} := \frac{60 \cdot \nu_{239} + 30 \cdot \nu_{240} + 10 \cdot \nu_{241}}{100}$$

$$\eta_{tot} := \frac{\nu_{tot}}{(1 + \alpha_{tot})} \qquad \eta_{tot} = 1.898$$